

What is claimed is:

1. A printing device configured to print a printing fluid onto a printing medium, the printing device comprising:
 - a printing fluid reservoir configured to hold a volume of the printing fluid;
 - 5 a print head assembly configured to transfer the printing fluid to the printing medium, wherein the print head assembly is fluidically connected to the printing fluid reservoir; and
 - 10 a printing fluid detector configured to detect a characteristic of the printing fluid, wherein the printing fluid detector includes a first electrode and a second electrode configured to be in contact with the printing fluid, and wherein at least one of the first electrode and the second electrode includes an electrically conductive coating disposed over an electrically conductive substrate.
2. The printing device of claim 1, wherein the substrate is made at least partially of a material selected from the group consisting of stainless steel, gold, palladium, activated carbon, carbon black, carbon fiber cloth, graphite, glassy carbon, carbon aerogel, and cellulose-derived foamed carbon.
3. The printing device of claim 2, wherein the graphite is a graphite powder or a graphite cloth.
4. The printing device of claim 1, wherein the substrate is made at least partially of a carbon material modified by a technique selected from the group consisting of liquid-phase oxidations, gas-phase oxidations, plasma treatments, and heat treatments in inert environments.
5. The printing device of claim 1, wherein the electrically conductive coating is permeable to printing fluid and is configured to increase the effective surface area of the electrode accessible to the printing fluid.

6. The printing device of claim 1, wherein the electrically conductive coating is made at least partially from an electrically conductive polymer.

7. The printing device of claim 6, wherein the electrically conductive 5 polymer is selected from the group of electrically conductive polymers consisting of polypyrroles, polyanilines, polythiophenes, conjugated bithiazoles and bis-(thienyl) bithiazoles.

8. The printing device of claim 6, wherein the electrically conductive 10 polymer is cross-linked.

9. The printing device of claim 1, wherein the electrically conductive coating is resistant to corrosion by printing fluid.

15 10. The printing device of claim 9, wherein the electrically conductive coating is made at least partially of a fluorine-containing polymer.

11. The printing device of claim 10, wherein the fluorine-containing polymer is a TEFLON material.

20 12. The printing device of claim 1, wherein the first electrode and second electrode are disposed at least partially within the printing fluid reservoir.

13. The printing device of claim 1, further comprising a conduit 25 fluidically connecting the printing fluid reservoir to the print head assembly, wherein the first electrode and the second electrode are disposed at least partially within the conduit.

14. The printing device of claim 1, wherein the print head assembly includes a print head assembly reservoir configured to be periodically refilled with printing fluid from the printing fluid reservoir, and wherein the first electrode and the second electrode are disposed at least partially within the print head assembly reservoir.

15. The printing device of claim 1, wherein both the first electrode and the second electrode are coated with the electrically conductive coating.

10 16. The printing device of claim 1, wherein the electrically conductive coating is a protective polymer coating, further comprising a printing fluid-permeable electrically conductive polymer coating disposed over the protective polymer coating.

15 17. A printing device configured to print a printing fluid onto a printing medium, the printing device comprising:

a printing fluid reservoir configured to hold a volume of the printing fluid;
a print head assembly configured to transfer the printing fluid to the printing medium, wherein the print head assembly is in fluid communication with the printing fluid reservoir; and

20 a printing fluid detector configured to detect a characteristic of the printing fluid, wherein the printing fluid detector includes a first electrode and a second electrode configured to be in contact with the printing fluid, and wherein at least one of the first electrode and the second electrode includes an electrically conductive coating permeable to printing fluid disposed over an electrically conductive substrate.

25 18. The printing device of claim 17, wherein the electrically conductive coating includes a plurality of interior surfaces contactable by the printing fluid.

19. The printing device of claim 18, wherein the electrically conductive coating is porous.

20. The printing device of claim 17, wherein the electrically conductive 5 coating is at least partially made of a polymer.

21. The printing device of claim 20, wherein the polymer is selected from the group consisting of polypyrroles, polyanilines, polythiophenes, conjugated bithiazoles and bis-(thienyl) bithiazoles.

10

22. The printing device of claim 20, wherein the polymer is cross-linked.

23. The printing device of claim 17, further comprising an electrically conductive protective coating disposed between the electrically conductive 15 substrate and the electrically conductive coating permeable to printing fluid.

24. The printing device of claim 23, wherein the protective coating is at least partially made of a TEFILON material.

20 25. A printing device configured to print a printing fluid onto a printing medium, the printing device comprising:

a printing fluid reservoir configured to hold a volume of the printing fluid;
a print head assembly configured to transfer the printing fluid to the printing medium, wherein the print head assembly is in fluid communication with 25 the printing fluid reservoir; and

a printing fluid detector configured to detect a characteristic of the printing fluid, wherein the printing fluid detector includes a first electrode and a second electrode configured to be in contact with the printing fluid, wherein at least one of the first electrode and second electrode includes a protective electrically 30 conductive polymer coating disposed over an electrically conductive substrate, the protective electrically conductive polymer coating being resistant to corrosion by the printing fluid.

26. The printing device of claim 25, wherein the electrically conductive coating is made at least partially of a fluorine-containing polymer.

27. The printing device of claim 26, wherein the fluorine-containing 5 polymer is a TEFLON material.

28. The printing device of claim 25, further comprising a printing fluid-permeable electrically conductive coating disposed over the protective electrically conductive polymer coating.

10

29. The printing device of claim 28, wherein the printing fluid-permeable electrically conductive polymer coating is made at least partially of a material selected from the group consisting of polypyrroles, polyanilines, polythiophenes, conjugated bithiazoles and bis-(thienyl) bithiazoles.

15